2.28 Quality Management Plan

2.28.1 *General*

The Design-Builder shall generate a Quality Management Plan (QMP) for the Phase 1 Services and another QMP for the Phase 2 work to guide and direct the quality of all design and construction required to deliver the Work, as applicable for the Phase 1 Services and Phase 2 Work. Unless otherwise set forth in the Technical Requirement, each reference to the QMP means both the Phase 1 Services QMP and the Phase 2 QMP, as applicable. Each QMP shall include all elements necessary to provide quality in all aspects and scopes of design, construction, change management, and final project documentation/closeout as applicable during the Phase 1 Services and Phase 2 Work for each respective QMP. The QMP shall fully describe the management structure, personnel, roles and responsibilities, standards adopted and specific procedures to be used to ensure the proper quality and contract compliance of all work products delivered in fulfillment of the PDB Contract.

The Quality Management Plan (QMP) shall be consistent with the summary information submitted with the Design-Builder's Proposal, and all comments from its review will be resolved to the satisfaction of the WSDOT Engineer. Review and Comment of the QMP by the WSDOT Engineer does not constitute a waiver of any Contract requirements, nor revise the WSDOT Engineer's authority within the Contract. Contract requirements shall take precedence over any of the Design-Builder's QMP provisions that provide a lower standard of performance. If the Design-Builder's Proposal proposes a higher standard of performance than is required in the Contract, the Proposal shall take precedence over the respective Contract requirement. A draft QMP for the Phase 1 Services shall be submitted to the WSDOT Engineer within 30 Calendar Days of the Notice to Proceed with the Phase 1 Services. The draft QMP for the Phase 2 Work shall be submitted to WSDOT as part of the 60 percent design package described in subtask 16.3 of Appendix 2 (Phase 1 Services) to the PDB Contract. The WSDOT Engineer will not accept any Final Design Submittals until the Design-Builder's final QMP for design has had all comments from its review resolved to the satisfaction of the WSDOT Engineer. No Phase 2 Work activities that require Quality Assurance (QA) and Quality Control (QC) inspection and testing shall commence until the Design-Builder's Phase 2 Work Quality Management Plan has had all comments from its review resolved to the satisfaction of the WSDOT Engineer. The Phase 2 Work Quality Management Plan shall remain in effect until all requirements of the PDB Contract have been fulfilled and the Project is accepted.

Fundamental elements of the QMP will include, at a minimum, design, materials, construction, permit compliance, Project closeout, and Project documentation. The QMP shall include a design section to establish how the Design-Builder will

oversee, review, correct, verify, and document the quality of the design documents (plans, specifications, reports, etc.) generated for this Project.

The Design-Builder's QA team is responsible for obtaining all documentation necessary for approval and acceptance of materials; obtaining materials certifications as required; ensuring that all required materials testing is completed; and ensuring that all test results meet Contract Standards. The Design-Builder's QA team shall inspect all Work and ensure that sufficient QA staff is present to determine whether the Work complies with Contract requirements, in accordance with the process required in the Contract Documents and the approved QMP.

The Design-Builder shall be responsible for all materials acceptance testing on this Project except for the State Inspected and Tested Items listed in TR Section 2.25, *Control of Materials*. The Design-Builder's QA team is responsible for performing all materials acceptance testing referenced in the Standard Specifications, the WSDOT *Construction Manual*, or any other Contract Document.

The QMP shall detail how the Design-Builder shall provide QA and QC for the design and construction of the Project and verify that all environmental and permit commitments are met to ensure the Work conforms to the Contract Standards. The Design-Builder shall comply with the applicable environmental requirements and the WSDOT and AASHTO publications listed in these Technical Requirements (TR) in preparing the QMP. The Design-Builder shall revise the QMP and its implementation when repetitive or recurring quality issues arise.

The Design-Builder's QMP shall include an organizational chart of the QA and QC personnel, listing the number of full-time equivalent employees, specific responsibilities for each employee, and the lines of authority and reporting responsibilities. The QA and QC teams and personnel shall be completely independent of each other, with separate reporting authorities. This organizational chart shall be updated to reflect any changes in QA and QC personnel as the Project progresses. The personnel and organizations performing QA functions shall have sufficient authority and organizational autonomy to identify quality issues and to be able to initiate, recommend, and verify the implementation of Corrective Action Plans. Personnel performing QA functions shall be at an organizational level that ensures they will not be influenced by the impact of the QA measures on the Project schedule, performance, or cost. The QMP shall list by discipline the name, qualifications, applicable certifications, duties, responsibilities, and authority for all personnel proposed to be responsible for QA and QC. Personnel performing QA functions shall not be assigned to perform conflicting duties.

WSDOT has developed a nonproject-specific quality management plan outline that is available on the WSDOT Design-Build website. The QMP Outline shall be used as the structural and organizational layout for development of the QMP.

2.28.1.1 Partnering and Dispute Resolution

Partnering shall be considered an integral part of the QMP. A partnering agreement shall be included in the QMP for handling disputes related to quality. During the initial partnering session, a separate procedure for conflict resolution shall be developed and agreed to by the partners. The procedure shall at a minimum include the following elements:

- Before the Phase 2 Services or Phase 2 Work begins, a time frame for resolving disputes at each level of authority shall be established and a list of typical disputes that could occur on the Project shall be developed.
- Disputes shall be delegated to the lowest appropriate level of authority on the Project team for resolution within the specified time frame.
- If the dispute is not resolved to the satisfaction of both parties within the specified time frame, the dispute shall be automatically elevated to the next level of authority on the Project team. The elevation process shall be developed by and agreed to by both the WSDOT Engineer and the Design-Builder at the conclusion of the initial partnering session.
- If still unresolved, the dispute shall then be directed to the highest level of authority where a final resolution shall be arbitrated by an unbiased third party, whose selection would be agreed upon in advance as part of the QMP.
- A written report prepared by the Design-Builder and signed by both the WSDOT Engineer and Design-Builder, describing the dispute, all subsequent actions, and the final disposition of the dispute shall be submitted to the Project records.
- If subsequent disputes arise regarding the same issue, the written report shall be included as a resource during the resolution process.

2.28.1.2 Pre-Activity Meetings

The Design-Builder shall hold pre-activity meetings to ensure that all Project personnel have a thorough understanding of the Work to be accomplished prior to beginning construction on a Work activity. If the scope of a work activity changes or if different Subcontractors are used to perform a work activity, additional pre-activity meetings shall be held. Work activities include design, survey, fabrication, and construction activities that generally correspond to the sections of the Standard Specifications, such as clearing and grubbing, earthwork, aggregate base, and Hot Mix Asphalt (HMA), or a definable feature of Work, such as pre-paving conference and pre-pour conferences for bridge decks.

The pre-activity meetings shall include discussions relating to what type of work shall be accomplished, by whom it will be performed, tools and resources required, and where, when, and how the Work will be done. The pre-activity meetings are to ensure that all parties have the same understanding of the design intent; have the appropriate plans, specifications, environmental requirements, and any special details; and are aware of safety regulations and procedures that need to be followed. The QA inspection checklist for each activity shall be reviewed in the meeting.

Pre-activity meetings shall be scheduled a minimum of 3 Calendar Days, but not more than 10 Calendar Days, or as mutually agreed upon by the Design-Builder and the WSDOT Engineer, prior to the start of each Work activity. The Design-Builder's Design QA Manager (DQAM) or Construction QA Manager (CQAM) shall plan, conduct, and take minutes at the pre-activity meetings. The Design-Builder shall document any clarifications and understandings related to the Work activity that are not documented elsewhere in the minutes of the meeting. The Design-Builder shall distribute the minutes to attendees and other QA, QC, and Quality Verification (QV) staff who require the information. Pre-activity meetings are classified as Hold Points and shall be identified in the QMP.

Example topics for a Pre-Activity Meeting:

- Scope (design criteria and intent, constraints)
- Applicable documents
- Work activity outline and schedule (what, where, who, when, and how)
- Staking Plan
- Safety regulations and procedures
- Maintenance of Traffic (MOT) Plan
- Environmental requirements
- Best Management Practices to be installed prior to and after the Work
- Notification, monitoring, and reporting requirements
- Work area ingress/egress
- Coordination and Utilities
- Inspection Plan/QA procedures
- Concurrent Work activities and QA staff coverage
- Status of submittals
- Acceptance criteria, including Hold Points
- Status of materials approval and acceptance requirements
- Frequency of materials testing
- Examination of the Work area

- Examination of stored material
- Open discussion

2.28.1.3 Quality Assurance Task Force

The WSDOT Engineer and the Design-Builder will jointly form a QA task force team. The QA Task Force Meetings will address and rectify issues relating to inspection, substandard material quality, inadequate QA and QC processes that need to be adjusted, test results that are out of tolerance, disparity between QA and QV test data, future quality concerns, disputes regarding correction of Nonconformance Reports (NCRs) and Nonconforming Issues (NCIs), and any issues that the WSDOT Engineer and the Design-Builder may have regarding the quality of the Project.

At a minimum, the Design-Builder shall assign the Project Quality Manager (PQM), the CQAM, the DQAM, the QC manager/superintendents, the personnel in charge of QA and QC activities, and any other personnel the Design-Builder acknowledges as having quality-related concerns from the design-build team to the QA team. The WSDOT Engineer may assign similar personnel related to the Project or others having quality concerns on the Project to the QA team.

Either the PQM, the DQAM, or the CQAM shall schedule meetings, develop agendas, document the meeting minutes, and distribute minutes to attendees. At the start of the design and construction phases, meetings shall be held weekly to discuss quality issues. The meeting frequency may decrease as quality issues decrease. If Contract performance becomes substandard, the WSDOT Engineer will require that the QA team meet more frequently.

The Design-Builder shall review all the current and unresolved NCRs and NCIs during the QA Task Force Meetings. For each NCR and NCI, the Design-Builder shall address the following items at the QA Task Force Meetings:

- Action taken by QC – How will QC or production ensure the NCR/NCI will not be repeated? How has this action been addressed in the QMP?
- Action taken by QA – How will QA ensure the NCR/NCI will not be repeated? How has this action been addressed in the QMP?
- Resolution of the initial issue that caused the NCR/NCI – How was it corrected?
- How to prevent the issue from becoming a recurring error?

Example topics for a weekly Quality Assurance Task Force Meeting:

- Safety
- Schedule
- Review of previous action items from prior weeks
- Current and upcoming activities

- QA/QC inspections and testing
- Materials documentation status
- Review of statistical materials evaluation
- Open NCRs/NCIs
- Lessons Learned
- New issues

Note: For each item, the Design-Builder shall record clear action items, due dates, and responsibilities in the meeting minutes.

2.28.1.4 Nonconforming Work

The Design-Builder's QA staff shall identify and document all elements of Work that have not, or are believed to have not, been performed in accordance with the approved drawings and specifications, the Contract Documents, and the reason for nonconformance in an NCR. The NCR shall be submitted to the WSDOT Engineer in writing within 24 hours of identification, and a copy sent to the Design Manager.

2.28.1.5 Nonconformance Report Remediation

For every instance of Nonconforming Work that is cited by the Design-Builder or by the WSDOT Engineer, the Design-Builder shall perform remediation to bring the Work into compliance with the Contract Documents. The method of remediation shall be chosen by the Design-Builder's Construction Manager and the Engineer of Record (EOR). Remediation may involve additional Work in the field and shall always involve documentation. The remediation chosen by the Design-Builder shall be contractually compliant. When the Design-Builder chooses to repair the Work or to let the Work remain in its As-Built condition, the EOR shall evaluate the effect the Nonconforming Work and its remediation has on the performance, safety, durability, long-term maintenance, and life of the item of Work. This evaluation shall be in the form of a memorandum, sealed and signed by the EOR in accordance with Title 18 RCW and submitted to the WSDOT Engineer for acceptance. For certain circumstances (i.e., temporary Work), the Design-Builder may propose a written letter submitted to WSDOT explaining why an evaluation is not needed, the merits of which will be judged by WSDOT at its sole discretion.

The documentation of the EOR's evaluation submittal shall be included in every NCR or NCI file and submitted to the WSDOT Engineer as part of a Nonconformance Closure Report prepared by the Design-Builder for the WSDOT Engineer. The Design-Builder shall submit copies of the chosen remediation to the WSDOT Engineer for Review and Comment within 7 Calendar Days of completing the Nonconforming Work remediation. If the remediation involves Work in the field, the Design-Builder shall submit an advance copy of the sealed

and signed Remediation Plan to the WSDOT Engineer for Review and Comment 24 hours prior, not including weekends and holidays, to starting the remediation. The CQAM shall also sign the NCR/NCI file stating the remedial actions implemented have undergone inspection and testing as required by the Contract Documents. Any new sealed and signed Design Documents that are prepared by the Design-Builder as a result of remediation shall be subject to the complete QA and QC process as provided for elsewhere in this Section.

2.28.1.6 Work with Nonconformance Reports

When the WSDOT Engineer does not agree with the remedial actions set forth in the NCR, the WSDOT Engineer has the authority to call for the removal of the Nonconforming Work or to stop Work within that area until the Corrective Action Plan has been approved by the WSDOT Engineer.

2.28.1.7 Nonconformance Reports Reporting

The CQAM shall maintain a log of all NCRs and Corrective Action Plans and present them at the QA team meetings. The CQAM shall number each NCR and Corrective Action Plan sequentially and shall maintain an active summary log that provides a brief description and status of the Nonconforming Work. The CQAM shall not grant acceptance for any portion of Work that has an outstanding NCR.

2.28.1.8 WSDOT Nonconforming Issues and Audit Findings

WSDOT retains the right to write its own NCIs and audit findings based on its observance of Work. NCIs and Audit Findings generated by the WSDOT Engineer will be entered into the Construction Audit Tracking System (CATS) and will require the same review and ultimate closure as NCRs generated by the CQAM.

2.28.1.9 Executive Management Review

The Design-Builder's executive management (Person or group with overall project management responsibilities) shall approve the QMP and conduct a review or an internal audit of the QMP at least quarterly, and more frequently if repetitive QA issues and Corrective Action Reports have been issued. This review or internal audit shall ensure the QMP's ongoing suitability and effectiveness in satisfying the requirements of the PDB Contract and the Design-Builder's stated quality policy and objectives.

The Design-Builder shall invite the WSDOT Engineer to participate in the Executive Management Reviews.

At a minimum, the Executive Management Review or internal audit shall evaluate the results of the review, WSDOT audit results, Corrective Action Reports, and plans implemented as a result of the NCRs and NCIs. The Design-Builder shall

respond within 20 Calendar Days to requests for the implementation of Corrective Action Plans that result from Executive Management Reviews. The Design-Builder shall incorporate the updated Corrective Action Plan into the QMP in a timely manner. Any changes to the QMP shall be approved by the WSDOT Engineer.

2.28.1.10 Quality System

2.28.1.10.1 General

The Design-Builder shall prepare a QMP that includes a quality system, which meets the Contract Standards.

The hierarchy of the documents describing the quality system shall be:

- Quality policy (for the entire system)
- Quality objectives
- Resources (for each section of the QMP)
- Procedures
- Work instructions

The QMP shall include a flow chart or other graphical representation showing the processes and their relationships to each other, the inspection and test controls, and a narrative for each process.

The QMP shall include written procedures that describe the purpose, overview, responsibilities, and steps of the quality system process, and records resulting from the process.

The QMP shall include an Inspection and Test Plan describing all the proposed QA inspections and tests to be performed throughout the construction process. The CQAM shall review and approve all Inspection and Test Plans.

In addition, the QMP shall:

- Describe all the material receiving, in-process, and final inspections and tests to be undertaken.
- Identify what products or services are to be Subcontracted or supplied that require QMP training.
- Describe the process to verify compliance by suppliers and Subcontractors with requirements.
- Identify who within the construction QA organization has stop Work authority.

2.28.1.10.2 Vacant

2.28.1.10.3 Other Project Documents

The QMP shall describe how it is applied to all submittals required by the PDB Contract. The following is a list of plans and documents that may be required in addition to the design and construction documents specifically addressed in this Section. This is not a comprehensive list; other documents may be required to complete the Work.

- Safety Management Plan, including Accident Prevention Program, and Site Safety Plan
- Project Communications Plan
- Environmental Compliance Plan
- Environmental Commitment Close-Out Report
- Environmental permit application materials
- Utility Management Plan
- Project progress schedule
- Submittal schedules
- Design schedule, acknowledging documents, or packages that will be submitted for review
- Roadside Work Plan
- Traffic Management Plan
- Traffic Incident Management Plan
- Issue Resolution Plan
- Document Control Work Plan
- Construction documentation at a minimum including:
  - Inspector's Daily Reports (IDRs)
  - NCRs and NCIs
  - QA and QC inspection checklists
  - Materials Testing Reports
  - Traffic Control Supervisor's Daily Report

2.28.1.11 Pre-Approved Corrective Action Plan

The Design-Builder shall develop a Pre-Approved Corrective Action Plan that shall be incorporated into the QMP. The Pre-Approved Corrective Action Plan shall be approved by the WSDOT Engineer.

The Pre-Approved Corrective Action Plan shall address Work that does not meet specifications, out-of-specification material, or pre-approved re-work and repair procedures.

The following is a sample list of items for which pre-approved retesting, re-work, and repair procedures are commonly needed. Anticipated failures may include, but are not limited to, the following:

Soil

- Use of improper or incorrect density standards
- Lack of compaction
- Subgrade too wet
- Subgrade too soft
- Slope failure
- Materials out of specification
- Soil too wet

Hot Mix Asphalt

- Materials out of specification
- Low density

Rebar

- Poor or incorrect locations
- Insufficient clearance or lack of support
- Damaged epoxy coating on reinforcing steel, including damage due to field cutting or bending
- Broken ties or displaced bars
- Out-of-specification, post-tension tendon elongations
- Post-tensioning ducts that fail air pressure testing

Concrete

- Slump out of specification
- Improper cold weather curing
- Rock pockets, small and large
- Repair of cracked concrete
- Temperature out of specification
- Air content out of specification (too low or too high)
- Inadequate counter reporting
- Improper certification of compliance

- Exceeding the maximum allowed time between concrete lifts
- Over time limit
- Incorrect mix design
- Non-functioning concrete sample cure box

The Design-Builder shall add retesting, re-work, and repair procedures to the QMP as repetitive nonconformances are identified.

2.28.2 *Design-Builder Quality Assurance and Quality Control Staff*

2.28.2.1 Project Quality Manager

The Design-Builder shall designate a PQM who shall be responsible for developing and updating the QMP, ensuring that all elements of Work are performed by the Design-Builder in accordance with the PDB Contract, ensuring adequate staffing and expertise is being utilized for the Design-Builder's QA and QC effort, and scheduling and facilitating the Executive Management Review. The PQM shall report directly to the Person or group with overall project management responsibilities such as the Project Manager, an off-site principal with binding authority for the Design-Builder, or an executive oversight committee established for the Project. The PQM could also be the DQAM or the CQAM but cannot be both the DQAM and CQAM.

Minimum Qualifications

The PQM shall have at least 10 years of recent experience in the management of a quality management program for highway design-build projects.

2.28.2.2 Design Quality Assurance Manager

The Design-Builder shall designate a DQAM who shall have overall responsibility for the design portion of the QMP. Through audits, the DQAM shall be responsible for verifying and validating that the QA and QC procedures required by the QMP are administered and followed. The DQAM shall audit design packages for both temporary and permanent Work. The DQAM shall report to the PQM. The DQAM could also be the PQM but cannot be the CQAM.

In accordance with this Section and the QMP, the DQAM shall certify that all Design Documents have been subjected to all required QC checking procedures; all documentation has been completed and filed in an acceptable manner; and all design packages have been subjected to a QA audit prior to submittal to the WSDOT Engineer or prior to release.

Minimum Qualifications

The DQAM shall be a Licensed Professional Engineer and have at least 10 years of recent experience in the design or quality management of highway projects.

2.28.2.3 Construction Quality Assurance Manager

The Design-Builder shall designate a CQAM who shall have overall responsibility for the implementation of the construction portion of the QMP. The CQAM shall be responsible for implementing, monitoring, and adjusting the processes to ensure acceptable quality. The CQAM shall report directly to the Project Quality Manager. The CQAM could also be the PQM or the Quality Testing Supervisor (QTS) but cannot be the DQAM.

It is the responsibility of the CQAM to implement quality planning; oversee the QA testing and inspection; and coordinate with WSDOT's verification testing, inspection, and Independent Assurance (IA) requirements. All duties listed for the Project Engineer in Section 9-1.4 of the WSDOT *Construction Manual* shall be the responsibility of the CQAM or designee. The CQAM shall not be assigned to perform conflicting duties on the Project. The CQAM is an oversight position, therefore, shall not perform testing or inspection duties. The CQAM shall have the authority to stop any Work that does not meet the standards, specifications, or criteria established for the Project.

The CQAM or a designated Assistant CQAM shall be available so that they can be on the Culvert Site within 2 hours of being notified of a problem regarding the QA of any Work being performed by the Design-Builder, or any of its Subcontractors or agents.

Minimum Qualifications

The CQAM shall have at least 6 years of recent experience overseeing the inspection and materials testing on major highway construction projects. Of the 6 years minimum, the CQAM shall have a minimum of 3 years of experience in construction materials acceptance administration and a minimum of 3 years of experience in construction inspection administration. The experience of an assistant to the CQAM may be used to meet the experience requirement of up to 3 years of either construction inspection or construction materials administration.

2.28.2.4 Materials Approval Engineer

The Design-Builder shall designate a Materials Approval Engineer who shall have authority for the approval of all materials and shall review and approve all materials submitted through Request for Approval of Materials, QPL, and proprietary items for the Project in accordance with Section 9-1.3 of the WSDOT *Construction Manual*. The Materials Approval Engineer shall report directly to the Design Manager. The Materials Approval Engineer could also be the PQM or the DQAM but cannot have responsibility for construction production.

Minimum Qualifications

The Materials Approval Engineer shall have 5 years of design experience in major highway design or equivalent and shall be a Licensed Professional Engineer. The

Materials Approval Engineer shall be an employee of the firm that leads the design for the Design-Builder, shall be independent from construction QA, and shall report to the EOR.

2.28.2.5 Quality Testing Supervisor

The Design-Builder shall provide a QTS who may be an employee of the Design-Builder's QA testing laboratory or of the independent testing laboratory hired to perform the QA testing. The QTS shall be a WAQTC certified tester in the Aggregate module, Asphalt level II module, and in-Place and Embankment Densities modules. The QTS shall also be certified in concrete testing by the American Concrete Institute (Level I). The QTS or their representative shall be at the Site where the testing is being performed. The QTS shall schedule, review, and verify for compliance all test reports performed by the QA testing laboratory. The QTS shall report to the CQAM. The QTS cannot have responsibility for construction production.

Minimum Qualifications

The QTS shall meet one of the following qualifications:

- Licensed Professional Engineer; an Engineer-In-Training; or a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology, Construction, or related degree; and at least 4 years of highway materials testing experience
- Certification by the National Institute for Certification in Engineering Technologies in the Construction Materials Testing field as an Engineering Technician (Level III) or higher, with at least 4 years of experience in the appropriate subfield in which sampling and testing is being performed
- A minimum of 8 years of highway materials testing and construction experience

2.28.2.6 Electrical/Intelligent Transportation Systems Field Inspector

The Design-Builder shall provide an Electrical/Intelligent Transportation Systems (ITS) Field Inspector. The Electrical/ITS Field Inspector shall report to the CQAM. The Electrical/ITS Field Inspector cannot have responsibility for construction production or QA inspection. The Design-Builder may supply more than one Electrical/ITS Field Inspector if desired or as needed to meet Contract inspection requirements.

The Design-Builder's Electrical/ITS Field Inspector is responsible for the following:

1. Verify that material supplied in the field matches the appropriate material approvals

2. Observe the installation of all illumination, traffic signal, and ITS materials in the field. No Work may be performed, and no materials may be installed without the Electrical/ITS Field Inspector present or notified.
3. Notify the WSDOT Engineer when there is a question ~~in regard to~~regarding any illumination, traffic signal, or ITS equipment installation.
4. Notify the WSDOT Engineer when electrical and ITS components are ready to be inspected for code compliance, functionality, and acceptance as required by WAC 296-46B-010. This notification is required prior to energizing any new equipment, including additions to existing systems.

2.28.2.6.1 Minimum Qualifications

The Electrical/ITS Field Inspector shall have the following minimum qualifications:

- Journey Level Electrician certificate (EL-01) issued by the Washington State Department of Labor and Industries and a minimum of 2 years of experience in the installation of highway electrical systems, including any combination of illumination, traffic signal, and ITS systems experience; or
- A minimum of 4 years of continuous practical experience in the installation or inspection of highway electrical systems, including any combination of illumination, traffic signals, and ITS systems experience; or
- A minimum of 2 years of electrical training in a college of electrical engineering of recognized standing and 2 years continuous practical experience in the installation or inspection of highway electrical systems, including any combination of illumination, traffic signal, and ITS systems experience.

The Design-Builder's Electrical/ITS Inspector shall attend the WSDOT Advanced Electrical Inspection Class at the first available opportunity.

2.28.2.7 Quality Assurance Testing Technicians and Quality Assurance Inspection Technicians

2.28.2.7.1 Quality Assurance Testing Technicians

The QA Testing Technicians performing the field and laboratory QA sampling and testing shall be employed by the Design-Builder or an agent's laboratory. The QA Testing Technicians shall not be affiliated with or employed by any materials supplier or subsidiaries or the QC organization. The QA Testing Technicians shall not perform QC testing. The QA Testing Technicians shall report to the CQAM or the QTS.

Minimum Qualifications

The QA Testing Technicians shall have the following qualifications for all tests they perform:

- Qualified/certified in accordance with WAQTC Aggregates module, Asphalt Level II module, In–Place Density module, and AASHTO R-18, using the procedural checklist in the WSDOT *Materials Manual* (Appendix 4). All acceptance testing in the laboratory or in the field that is part of a WAQTC module shall be performed by a WAQTC-certified testing technician. The qualifications of the laboratory technicians employed by an AASHTO-accredited laboratory will be accepted for performing AASHTO test methods only when confirmed by the laboratory's training and evaluation records. Copies of the qualification/certification records and the procedural checklists for each tester shall be provided to the WSDOT Engineer for review 3 Calendar Days prior to the tester performing any QA testing.
- Qualified in concrete testing by the American Concrete Institute (Level I)
- A minimum of 4 years of experience in WSDOT roadway or highway structures construction inspection.

The competency of each QA Testing Technician shall be re-evaluated annually in all tests they perform, in accordance with the laboratory's *Laboratory Quality Systems Manual* approved by the WSDOT Engineer.

2.28.2.7.2 Quality Assurance Inspection Technicians

The QA Inspection Technicians shall be on-site during all Work activities and shall inspect, verify materials, and document all construction activities for compliance with the PDB Contract. The QA Inspection Technicians shall not be affiliated with or employed by any materials suppliers or subsidiaries or the QC organization. The QA Inspection Technicians shall not perform QC inspection. The QA Inspection Technicians shall report to the CQAM.

Minimum Qualifications

The QA Inspection Technicians shall have the following qualifications:

- A minimum of 4 years of experience in WSDOT roadway or highway structures construction inspection.

2.28.2.7.3 Quality Assurance Staff Training

The Design-Builder shall provide training to the QA staff in the applicable procedures for the inspection of Work and material sampling and testing. The professional training and experience of the QA staff (including biologists, hydrologists, and geotechnical engineers) shall be commensurate with the scope, complexity, and nature of the activity to be inspected, monitored, or tested.

The QA Testing Technicians and construction Inspectors may attend the instructional courses WSDOT provides its personnel on a space-available basis, at

no cost to the Design-Builder. These classes may be offered only once a year. The following classes will be available:

Course	Hours
Asphalt Paving Street Inspection	4
Drainage Inspection	4
Bridge Substructure Inspection	4
Bridge Superstructure Inspection	4
Drilled Shafts	4
Mechanically Stabilized Earth Walls	4
Project Documentation	4
Excavation and Embankment Inspection	4
Nuclear Gauge, Embankment/Surfacing/Pavement Applications	4
Portland Cement Concrete Pavement Production, Placement, and Field Testing Procedures	4
Electrical – Illumination and Signals	4

2.28.2.7.4 Quality Assurance Staffing Levels

QA staffing levels shall be identified in the QMP and updated as necessary during the course of the Project to reflect the actual construction schedule. The size of the QA staff shall reflect the complexity, needs, shifts, and composition of the construction activities consistent with the construction schedule, relative locations of the Work to be covered, and specific nature of the Work. Revision to the Staffing Plan or organizational chart will not require revision to the QMP unless it is a position identified in the Proposal. If an update is required due to Staffing Plan or organizational chart changes, this may occur as part of the next update to the QMP. The WSDOT Engineer will Review and Comment on proposed staffing levels to ensure the Project requirements are adequately met. Construction shall not take place when QA staffing levels are inadequate to provide the inspection and testing required by the PDB Contract. At a minimum, there shall be at least one QA inspector on the Culvert Site at all times when permanent Work is being incorporated into the Project. The Design-Builder shall identify and provide adequate QA staff to fulfill all inspection and testing requirements, particularly during concurrent Work activities.

2.28.2.7.5 Rights to Remove Quality Assurance Staff

By written notice, the WSDOT Engineer reserves the right to permanently remove any of the following personnel from the Project:

- A QA Testing Technician who does not perform the QA tests in accordance with the test methods
- A QA Testing Technician who does not report test results accurately
- A QA Inspecting Technician or geotechnical or environmental monitor who, in the opinion of the WSDOT Engineer, does not exercise good judgment in the performance of their duty
- A QA Testing Technician who is not certified in accordance with the Contract Standards

2.28.2.8 Quality Control Testers and Personnel

The Design-Builder shall perform, control, and ensure that operational techniques and activities provide acceptable quality, and are in compliance with the PDB Contract. The QC personnel shall be a separate organization within the Design-Builder's organization; the Design-Builder's front-line supervisors; the supplier, producer, or manufacturer; but in no case shall be associated with the QA organization. The QC personnel shall be trained and provided the necessary tools, testing procedures, and inspection checklists to ensure the Work product meets the Contract Standards. The QC Testers and Inspectors shall report to the Construction Manager or designee. The designee shall not be the CQAM.

2.28.3 *Design Quality Assurance and Quality Control Requirements of the Quality Management Plan*

2.28.3.1 General

The QMP shall specify all aspects of the QA and QC for design. The QA and QC procedures for each type of Design Document and Released for Construction (RFC) Document shall be organized by engineering discipline. The Design-Builder shall include measures and objective evidence to ensure that appropriate quality standards are specified and included in the Design Documents and RFC Documents.

The QMP shall include the following:

- QA and QC procedures for preparing, submitting, checking, back-checking, correcting, and verifying all plans, calculations, Special Provisions, drawings, and other items to ensure that they are independently checked and back-checked by experienced architects and engineers, in accordance with generally accepted architectural and engineering practices. The Design-Builder originator, checker, back-checker, corrector, and verifier shall be clearly identified on the face of all submittals.
- Specific procedures for validating computer programs used on the Project
- QA and QC procedures for verifying that all submittals meet the requirements of the PDB Contract

- Assurance that all materials, equipment, and elements of Work have been specified and designed to perform satisfactorily for the purpose intended
- A defined process for stamping, signing, and dating, plans, reports, and other documents by the responsible Licensed Professional Engineer, where required by the PDB Contract
- The level, frequency, and methods of review for the adequacy of the design of the Project
- The method by which drawing changes are incorporated into a plan sheet. This shall include specific definitions of Minor Change and Significant Revision, the threshold between them, and how such changes will be reflected in a Design Document or RFC Document. The QMP shall also identify the specific process by which Significant Revisions will be reviewed and stamped by the original EOR including the process for evaluating the effect that nonconformances will have on the performance, durability, long-term maintenance, and life of the item of Work.
- The procedures for coordinating Work performed by different personnel in the same area, in adjacent areas, or on related tasks to ensure that conflicts, omissions, or misalignments do not occur between the drawings or between the drawings and the specifications; and to coordinate the review, approval, release, distribution, and revision of documents involving such personnel
- Identification of those elements of the PDB Contract, Design Documents, or RFC Documents requiring special QA and QC attention or emphasis, including applicable standards of quality or practice to be met, and level of completeness, the extent of detailing required, or both
- Identification by the discipline of the name, qualifications, duties, responsibilities, and authorities of all persons responsible for QA and QC
- Description of the name, qualifications, duties, responsibilities, and authorities of external technical experts necessary to ensure the quality of the design of the Project. Information regarding the anticipated timing, use, anticipated availability, and any coordination required with respect to any experts.
- Procedures for ensuring that the documents fully provide for the constructability and compatibility of materials
- Identification of the inspection guidelines for each item of Work to determine what significant characteristics of each item needs to be monitored during the construction phase to ensure that the completed Project will function in accordance with the design intent over its expected lifetime. The inspection guidelines shall include the appropriate criteria, tests, and inspection requirements described in this Section.

- Descriptions of the required design QA and QC functions, including scheduled activities for design QA and QC identifying the Design Documents and RFC Documents to be delivered to the WSDOT Engineer for Review and Comment at each stage of the design or construction phase of the Project. The QMP shall specify written certifications by the DQAM for each submittal document showing that all QMP requirements have been completed satisfactorily.
- Development and maintenance of an accessible Document Control System (DCS) by the Design-Builder to provide all relevant design inputs, including a list of references to design inputs that shall be used by design personnel in the design
- Verification by the Design-Builder that the design inputs are communicated to, and accessible by, the relevant designers responsible for incorporating design inputs into the design
- Specification of QA procedures to verify the construction surveying, property surveying, establishment of Right of Way (ROW) markers, As Built Plans, re-established city, county, and subdivision monuments, and Record of Survey Map
- A defined process for tracking the design drawings through the Final Design Documents, including the RFC Documents
- Geotechnical Special Inspection Plan (GSIP)

The QMP shall describe procedures to require that a written certification is signed by the DQAM verifying that all quality procedures have been completed in accordance with the QMP prior to being sent to the WSDOT Engineer for Review and Comment

2.28.3.2 WSDOT Design Review

The QMP shall define the timing, content, and format of all design reviews and shall incorporate all of the requirements of the TR. Unless otherwise stated in the PDB Contract, the Design-Builder shall provide a 14 Calendar Days review period for the WSDOT Engineer Review and Comment on all design submittals, except for submittals received between 6:00 pm Friday and 6:00 am the following Monday, in which case the WSDOT Engineer reserves the right to extend the review time by 2 Calendar Days. WSDOT reserves the right to extend the review time by up to 7 Calendar Days for submittals that are received between November 15 and January 1, for submittals with overlapping review periods, which are being reviewed by the same discipline team, and for submittals that contain over 100 pages of plans or calculations.

The Design-Builder shall address all comments made by the WSDOT Engineer in each Submittal and shall include comment resolutions in subsequent submittals.

The Design-Builder shall schedule and maintain minutes of all resolution meetings with the appropriate WSDOT staff to document and resolve the Design-Builder's responses to the comments. It is intended that all comments shall be resolved at these meetings. If an agreement is not reached on any specific comment, it shall be resolved as described in the QMP.

2.28.3.3 Design Task Forces and Over-The-Shoulder Reviews

The QMP shall also include processes and procedures for how regular (weekly) scheduled task force meetings between the WSDOT Engineer and the Design-Builder will be used to support quality goals. These meetings, combined with over-the-shoulder reviews, shall be an integral part of the process to discuss and resolve design issues outside of the formal review process.

The QMP shall define how over-the-shoulder reviews with WSDOT during the development of each design package will be included. The over-the-shoulder reviews are not Hold Points that restrict the progress of design. They are reviews of the design as it progresses, and opportunities for the WSDOT Engineer to provide comments and feedback on the design.

2.28.3.4 Released for Construction Document Review

At a minimum, the Design-Builder shall provide a preliminary and a final submittal of all plans and Technical Specifications and resolve all comments prior to being RFC. Working Drawing comments shall be resolved prior to being RFC. Special Provisions shall not be included by reference but shall have their full text included in the Final Design Submittal and RFC Documents. Special Provisions that are not part of the Work shall not be included in the RFC Documents. Any deviation from the Mandatory Standards and these TR shall be approved by the WSDOT Engineer prior to a submittal being RFC.

Construction shall not proceed on any element of Work until the relevant submittal is stamped "Released for Construction" by the DQAM, and all required approvals have been obtained by the Design-Builder.

2.28.3.4.1 Technical Specifications

The Standard Specifications are supplemented and modified by, the Special Provisions, and these TR. The Design-Builder shall develop any Project Specifications required to address Work not covered by the Standard Specifications, Special Provisions, or these TR. If a Project Specification is determined by the WSDOT Engineer, in its sole discretion, to be a change to the Standard Specifications or Special Provisions; the Design-Builder shall submit a Design-Builder Initiated Change in accordance with Section 1-04.4 of the *General Provisions*.

2.28.3.4.2 Preliminary Design Submittal

The Preliminary Design Submittal shall provide a formal opportunity for WSDOT, the Design-Builder, various design team disciplines, and other approved Project stakeholders to ensure through construction document review that the design is progressing appropriately and proceeding in the right direction; that the plans reflect Design-Builder requirements for construction; that design features are coordinated; and that there are no fatal flaws within a given discipline or between disciplines. The minimum contents of the Preliminary Design Submittal for each discipline shall be as specified in this Section and as mutually agreed upon by members of the applicable task force; or by agreement between the WSDOT Engineer and the Design-Builder if no specific task force applies.

The Design-Builder shall include calculations, MicroStation, and InRoads files as necessary to allow for adequate review.

2.28.3.4.3 Final Design Submittal

The Final Design Submittal shall be prepared when the design for a given element or area is complete. The Final Design Submittal shall include plan sheets, specifications, technical memorandums, reports, calculations, Hold Points, and other pertinent data, as applicable. As a result of the ongoing discussion and resolution of design and construction issues through the regularly scheduled task force meetings and over-the-shoulder reviews, it is anticipated that there will be very few revisions or changes at this stage.

The Final Design Submittal shall include the Technical Specifications. Following the resolution of all comments, the Final Design Submittal may proceed through the written certification process described below in preparation for being RFC.

2.28.3.4.4 Released for Construction Documents

The QMP shall describe how the Design-Builder will ensure that the RFC Documents reflect all QA, QC, and design reviews required by the QMP and the PDB Contract. The QMP shall also describe the written certification process to be used to verify to the WSDOT Engineer that all QA procedures have been completed to ensure that all review comments have been incorporated as agreed to during the comment resolution process between the WSDOT Engineer, any affected municipalities, and the Design-Builder, and that the documents are ready to be RFC.

Each sheet of the plan set and the cover of each set of Technical Specifications in the RFC Documents shall carry the Licensed Professional Engineer’s stamp and signature and shall be stamped "Released for Construction" and initialed and dated by the DQAM.

Once plans, associated Hold Points, and Technical Specifications have been RFC, the Design-Builder shall provide the WSDOT Engineer with six hard copies and

electronic files of all RFC Documents. Electronic files shall be provided in both MicroStation, InRoads, and PDF formats shall be in accordance with the WSDOT *Electronic Engineering Data Standards* (Appendix 4~~), and~~) and shall be submitted on a USB flash drive. The electronic drawing files shall include copies of all sheet and reference files used in the RFC Documents.

Prior to submittal, electronic files for all RFC Documents, except the MOT Plans, shall be checked by the Design-Builder to ensure that they conform to the WSDOT *Plans Preparation Manual* file naming and drawing symbology (e.g., level contents, and line and text symbology). The drawing symbology and file naming for each electronic drawing file shall meet or exceed a minimum conformance level of 90 percent, and the average conformance level for all drawing files shall be 95 percent or greater. MOT Plans are not required to meet the conformance level criteria. The Design-Builder shall provide the WSDOT Engineer with a Microsoft Excel spreadsheet for each RFC submittal containing the file name and the corresponding conformance level for every file that is part of the submittal. Certain files provided to the Design-Builder by the WSDOT Engineer, such as base mapping or vicinity maps, may be excluded from the conformance level requirement. The Design-Builder shall obtain written confirmation from the WSDOT Engineer as to which files are exempt from compliance with the WSDOT *Plans Preparation Manual*.

Construction shall not proceed on any element of Work until the relevant submittal is stamped "Released for Construction" by the DQAM, and all required government and private approvals have been obtained by the Design-Builder.

2.28.3.5 Quality Assurance and Quality Control of Design Changes

The QMP shall describe the process for implementing design changes, including field changes, shown on the Design Documents and RFC Documents. The design changes shall be subject to QA and QC measures and procedures, commensurate with those applied to the original design or that portion of the Project under consideration for change.

The QMP shall explain how changes will be identified as a Minor Change or Significant Revision and then identify how Significant Revisions to Design Documents and RFC Documents will be incorporated, stamped, and reviewed before being re-released.

The QMP shall also address and clearly define the number of changes to a drawing that will result in a drawing revision and the time frame for the release of the updated drawing. Each drawing revision shall be assigned a number. The revision number shall be assigned sequentially, with each change in a document or plan sheet identified by the revision number. The assigned number shall be located both at the location of the change on the sheet and in the revision block of the document with an explanation of the change.

2.28.3.6 Working Drawings

The QMP shall describe the personnel assigned to Working Drawing review and approval, the procedures for documenting reviews and obtaining approvals, the process for implementing corrective actions, the procedures for auditing and checking compliance to Working Drawings, and the distribution to the WSDOT Engineer for Review and Comment. The Design-Builder shall check and verify that Working Drawings are in compliance with the Technical Specifications and RFC drawings.

The Design-Builder shall include in their QMP a complete listing of all Working Drawings, including the classification category (Type 1, 2, 2E, 3, or 3E) of each drawing, that is required for the Project.

Working Drawings requiring Engineering, Types 2E and 3E, shall be prepared by (or under the direction of) a Licensed Professional Engineer, and in accordance with WAC 196-23-00. Associated supporting calculations shall carry the Professional Engineer's seal with registration number, signature, and date of signature on the cover page. The cover page shall also include the PDB Contract number, the PDB Contract title, and a sequential index to the calculation page numbers.

The Design-Builder shall submit all Working Drawings to the WSDOT Engineer. The submittal shall include one hard copy in PDF format; drawing details shall be prepared in accordance with conventional detailing practices. If the WSDOT Engineer offers any comments, they will be submitted to the Design-Builder in accordance with this Section. Illegible documents will be returned, and resubmittal will be required.

Prior to submittal to the WSDOT Engineer, the Design-Builder shall resolve all comments from the Design-Builder's reviewer and provide a submittal that clearly indicates the Design-Builder has no further comments. The Design-Builder shall certify that the information on the Working Drawing meets the requirements of the PDB Contract and is in conformance with RFC Documents, including the plan sheets and Technical Specifications.

Type 1, 2, and 2E Working Drawings shall be submitted to WSDOT after RFC and a minimum of 7 Calendar Days before Work represented by the submittal begins.

The Design-Builder shall provide a 14 Calendar Day review period for the WSDOT Engineer to Review and Comment on Type 3 and 3E Working Drawing Submittals, except for submittals received between 6:00 pm on Friday and 6:00 am the following Monday, in which case the WSDOT Engineer reserves the right to extend the review time by 2 Calendar Days. The WSDOT Engineer reserves the right to extend the review time by up to 7 Calendar Days for submittals that

are received between November 15 and January 1. The Design-Builder shall resolve all comments prior to RFC.

2.28.3.7 As-Built Documentation

The QMP shall describe how the Design-Builder will ensure that the As-Built Plans meet the requirements of the PDB Contract and accurately represent the as-constructed conditions in the field; and how the As-Built Plans are updated continuously to reflect all changes and made available for periodic reviews conducted by the WSDOT Engineer or their designees.

2.28.3.8 Document and Data Control

The QMP shall describe the procedures to be used in managing and documenting all Project files. The Design-Builder shall establish and maintain its own DCS, in accordance with TR Section 2.1, *General Information*, to store and record hard copies and electronic records including, at a minimum, all correspondence, meeting minutes, design inputs, drawings, progress reports, technical reports, specifications, Contract Documents, submittals, calculations, test results, inspection reports, NCRs, administrative documents, and other documents generated under the PDB Contract. The Design-Builder shall ensure that its DCS is compatible with the DCS used by the WSDOT Engineer.

The QMP shall describe the methods by which all documents issued and received by the Design-Builder will contain a unique serialization, date issued or received, Project name, Contract name, Contract number, specific subject or content of the correspondence, name of the sender or recipient, and reference information to which the correspondence relates to, such as prior correspondence. The Design-Builder shall maintain separate incoming and outgoing correspondence logs.

All documents shall be maintained by the Design-Builder for the duration of the PDB Contract, and shall be organized, indexed, and delivered to the WSDOT Engineer upon Final Acceptance unless required to be delivered earlier pursuant to the PDB Contract; or within 7 Calendar Days of receipt of the request from the WSDOT Engineer, even if the documents are incomplete. The documents shall include all test documentation, including those prepared by the WSDOT Engineer.

2.28.3.8.1 Document and Data Approval and Issuance

The QMP shall include a requirement that all deliverables include a signed and dated certification by the originator of the deliverable, and that the deliverable is complete and meets the Contract Standards.

2.28.3.8.2 Document and Data Changes

The QMP shall include a requirement that any changes to documents provided to the WSDOT Engineer are in a format that shows the changes clearly, and in a method that is easily trackable (e.g., documents use the redline/strikeout method).

2.28.3.9 Design Validation

The QMP shall describe all verification, validation, monitoring, inspection, and activities to be carried out for the purposes of demonstrating that the Work is acceptable and meets the requirements of the PDB Contract Documents.

2.28.4 *Materials Quality Assurance and Quality Control Plan Requirements*

2.28.4.1 General

The QMP shall specify all aspects of the Materials QA and QC Plan. At a minimum, the Materials QA and QC Plan shall include the items described in this Section to verify that all materials conform to the Contract Standards. The Materials QA and QC Plan shall be separate functions performed by separate personnel who have no affiliation to each other or to the same organization.

2.28.4.2 Design-Builder Responsibilities

The Design-Builder shall be responsible for the quality of construction and materials incorporated into the Project. The Design-Builder's QC measures are intended to ensure that operational techniques and activities provide material of acceptable quality.

The Materials QA organization shall be responsible for the acceptance of all materials and workmanship incorporated into the Project. The Materials QA organization shall also perform sampling and testing, determine acceptance or rejection of the materials, and implement a tracking system to monitor nonconforming materials and disposition of nonconforming materials, according to the PDB Contract.

2.28.4.3 Materials Testing Quality Program

The Design-Builder shall monitor and measure the characteristics of all Work activities to verify that all Project requirements have been met. This monitoring and measurement shall be carried out at appropriate stages of construction in accordance with the planned Work and minimum frequencies for sampling and testing as described in TR Section 2.25, *Control of Materials.*

The Design-Builder's QA test data shall be used for acceptance, provided it can be statistically verified by the WSDOT Engineer's QV test data, except as noted in this Section. In the event of discrepancies between the WSDOT Engineer's and the Design-Builder's test data: the QA team will attempt to resolve them through

the QA task force. If a resolution cannot be reached, then WSDOT's QV test results shall be used for acceptance.

The levels of quality management provided by the Design-Builder and the WSDOT Engineer where testing is being used for acceptance are:

Quality Control – The Design-Builder shall be responsible for QC, which is defined as activities performed by the Design-Builder, the producer, or the manufacturer to ensure that a product is of uniform quality and meets the Contract Standards. Components of QC may include inspecting and obtaining material certifications, materials handling, construction procedures, calibration and maintenance of equipment, production process controls, and any sampling, testing, or retesting conducted for these purposes.

Quality Assurance – The CQAM shall be responsible for the materials sampling, testing, and processes for QA. Testing for QA includes all planned (e.g., audits and assessments) and systematic actions necessary to ensure that all materials incorporated into the Work meet the Contract Standards for the material being used and will perform satisfactorily for the purposes intended. All materials sampling and testing for QA shall be performed by a statistically valid, random sampling method using testing methods and minimum frequencies defined in this Section, the WSDOT *Construction Manual*, the WSDOT *Materials Manual,* and the PDB Contract.

Quality Verification – The WSDOT Engineer or its agent will perform an independent material QV to validate the Design-Builder's sampling and testing QA program. All verification sampling and testing will be performed by a statistically valid, random sampling method using testing methods defined in the WSDOT *Construction Manual,* the WSDOT *Materials Manual*, and the PDB Contract.

WSDOT Acceptance Testing – WSDOT will perform Inspection and Acceptance Testing in accordance with TR Section 2.25, *Control of Materials*.

Independent Assurance – The IA is an independent verification performed by the WSDOT Engineer which includes an observation of sampling and testing procedures, a review of the qualifications of the tester, and a verification of the testing equipment used to perform acceptance testing activities. The IA will validate both the Design-Builder's QA processes and WSDOT's QV processes. The IA may include auditing of acceptance testing records, observing the tests being performed by the Design-Builder's technicians, or taking split samples with the Design-Builder on a random basis for verifying the Design-Builder's testing equipment. WSDOT will enter the findings of all IA observations into the CATS. Any deficiency will result in an NCI. The Design-Builder shall take corrective action immediately for any noted deficiencies.

Quality Assessment – WSDOT will perform nonscheduled quality assessments of the Design-Builder's Work, including sampling, testing, and documentation reviews.

2.28.4.4 Materials Testing Laboratory

All QA testing that will be used for the acceptance of materials shall be performed by a laboratory approved by the WSDOT Engineer. The QA Laboratory Manager shall report directly to the QTS. The Design-Builder or a Subcontractor shall employ the laboratory personnel. The materials testing laboratory that is used for QA testing shall not perform QC testing, and shall not be owned, operated, equipped, or staffed by material suppliers. The laboratory shall meet the requirements of AASHTO R 18 for WAQTC-certified/qualified testers and calibrated/verified equipment and be able to accomplish the testing according to the test procedure they are performing.

The Design-Builder's laboratory shall develop and maintain a *Laboratory Quality Systems Manual*. The Manual shall include the following:

- Staff qualifications, position descriptions, and the qualification process
- Listing of test procedures approved for performance throughout the Project
- Equipment including verification, calibration, recall procedures, and inventory
- Test reports, worksheets, summary logs, and forms
- Sample management procedures
- Diagnostic and Corrective Action Reports
- Quality systems review

The WSDOT Engineer will perform an on-site evaluation of the facility, in accordance with WSDOT QC 3, Quality Systems Laboratory Review in the WSDOT *Materials Manual*, to ensure all Work is being performed according to the PDB Contract. The evaluation will include audit and inspection functions, review of training, equipment calibration, verification of records, and observance of testers as they perform the test procedures. For laboratories located outside of Washington State, or laboratories performing only minor testing, WSDOT may use the AASHTO Accreditation Program, or another state's Department of Transportation to inspect the laboratory.

The Design-Builder shall request the WSDOT inspection a minimum of 14 Calendar Days prior to the start of testing. Together with the request, the Design-Builder shall submit a copy of the *Laboratory Quality Systems Manual*, and a list of the testing procedures that the laboratory shall perform throughout the Project. The laboratory shall be properly equipped, staffed, and fully operational at the time of WSDOT's inspection and for the duration of its use on the Project.

WSDOT will advise the Design-Builder in writing of any deficiencies noted during the inspection, and the Design-Builder shall take immediate action to correct them. Work requiring laboratory acceptance will not proceed until the laboratory and its staff has been inspected and has received written approval from the WSDOT Engineer.

The test equipment for the following test procedure shall be as shown below and in the Field Operation Procedure (FOP) in accordance with the WSDOT *Materials Manual* so that a proper correlation between the QA and QV test results may be established.

- WAQTC FOP for AASHTO T 310 In-place Densities by Nuclear Method (Troxler 3430, or 3440 Series Moisture/Density Gauge)

2.28.4.5 Materials Testing Frequencies and Random Sampling

The Design-Builder shall perform field and laboratory sampling and testing as specified in the Standard Specifications and the WSDOT *Materials Manual* to control these processes. The Design-Builder shall provide a minimum of 3 Calendar Days notification to the WSDOT Engineer prior to sampling and testing. Sampling and testing shall be performed by qualified testing personnel described in this Section. Representative samples shall be randomly obtained by the Design-Builder at specified frequencies as shown in TR Section 2.25, *Control of Materials*. The Design-Builder shall furnish copies of all test results to the WSDOT Engineer within 24 hours of completion of the test or the next Calendar Day For concrete cylinders, the test results shall be furnished within 24 hours after cylinder break.

The WSDOT Engineer or its agent will perform nondestructive shaft QV tests on at least one and up to 10 percent of the drilled shafts constructed for bridges. The Design-Builder shall make the shafts accessible to WSDOT Inspectors for nondestructive shaft testing and shall notify the WSDOT Engineer when drilled shaft concrete is placed in each shaft so the WSDOT Engineer can schedule nondestructive shaft QV testing. The WSDOT Engineer will inform the Design-Builder if a shaft will be nondestructive shaft tested within 2 Calendar Days of receiving the Design-Builder's notification that shaft concrete has been placed.

The WSDOT Engineer or its agent will perform independent materials QV sampling and testing to validate the Design-Builder's sampling and testing QA program. Typically, the testing rate will be one verification test for every five of the Design-Builder's acceptance tests. During production startup, the QV testing will be performed at the same frequency as the Design-Builder's QA program for the first five samples, to establish a statistical base for verification and acceptance. If at any time the QA and QV statistical base is not statistically validated, the QV testing may increase until the F and t variances are considered under control. When QV testing reaches 25 samples, and the QA and QV testing can be

statistically validated, the frequency of the QV tests may be reduced to one in 20. If at any time the QA and QV testing results have wide variances or cannot be validated, the QV testing frequency shall be increased to one in five until 25 samples are reached again with satisfactory statistical validation.

If the Design-Builder elects to take extra samples, the QV sampling frequency shall continue to be based on the frequency described in TR Section 2.25, *Control of Materials*.

For HMA, the Design-Builder shall conduct the acceptance testing for the asphalt-treated base and HMA aggregate, mixture, in-place density, and cyclic density at the frequency described in TR Section 2.25, *Control of Materials*.

Materials that require fewer than five tests for acceptance, or that have less than five sublots, will require the WSDOT Engineer and the QA personnel to test at the same frequency. Refer to Chapter 9 of the WSDOT *Construction Manual* for testing requirements. For all materials that are not addressed by WSDOT standards, the material testing specifications, testing procedures, and frequencies shall be determined by the QA team with the EOR's concurrence.

Small quantities of materials can be accepted without sampling and testing when the quantity of materials proposed for use by the Design-Builder is less than the minimum sampling and testing frequencies. Structural concrete shall not be considered as a small quantity. The CQAM shall follow the procedure for acceptance of small quantities described in this Section.

2.28.4.6 Testing Plan

All acceptance and verification sampling and testing shall be randomly obtained, at the location and frequency stated in the PDB Contract. The Design-Builder shall provide a Testing Plan for each material to the WSDOT Engineer. The Testing Plan shall identify the frequency, location for testing, test procedures, attributes to test, material acceptance requirements, Sampling Plan developed using WSDOT Test Method T 716 Method of Random Sampling, or other random number generators, and the estimated Project quantity. The Testing Plan shall be submitted prior to the beginning of production or placement of the material. The QMP shall include a method for notifying the QA organization of the quantity of material produced, placed, or delivered to the Project so that the testing effort can be current.

2.28.4.7 Materials Quality Analysis Program

The Design-Builder’s QA sampling and testing results shall be used for acceptance if they are validated by WSDOT’s QV sampling and testing.

Both the Design-Builder’s QA and WSDOT’s QV test results shall be recorded in the statistical analysis of materials software that will be provided by the WSDOT Engineer. This software shall be used to statistically evaluate the QA test data

against the QV test data to determine the acceptability of the QA test data. This evaluation shall be performed by using the F and t-Test analysis tool. This evaluation shall be performed on all test results for the total quantity of material placed for a single material type such as gravel backfill for walls, Crushed Surfacing Base Course, or gravel borrow. There need to be at least three QA and three QV test results to perform the F and t analysis.

The CQAM shall be responsible for performing this evaluation. Any test data that is found to be outside the normal F and t distribution shall be reviewed by the QA team, and a determination shall be made as to why the test data is outside the normal distribution.

The QA team shall identify the cause of discrepancies in the test results and generate a report defining the problems, the cause of the problems, and the solutions to prevent a recurrence. At a minimum, the review shall include the following actions:

- A check of test data, calculations, and results
- An observation of the sampling and testing by the IA Inspector
- A check of test equipment by the IA Inspector

The investigation and resolution of the discrepancy shall be documented by the QA team in the QA Task Force Meeting minutes within 14 Calendar Days of the noted discrepancy unless the IA investigation is delayed due to scheduling. If the QA team fails to identify the cause of discrepancies in the test results, then WSDOT's QV test results shall be used for acceptance.

2.28.4.8 Materials Documentation Review

The Design-Builder shall schedule regular documentation reviews to ensure that all materials documentation and certifications are complete prior to the material being installed on the Project.

WSDOT will perform periodic formal materials documentation reviews at approximately 50 percent Completion of construction of each Culvert Bundle. Items to be reviewed will be randomly selected by the WSDOT Engineer. These reviews are intended to ensure the Design-Builder is maintaining all necessary materials documentation and records. A final review will be performed at the Completion of the Project to ensure that all materials documentation is correct. A separate materials review may be performed by the State Materials Laboratory.

In addition to the formal reviews, WSDOT on-site personnel will perform periodic materials documentation checks. Examples of these checks include materials approval, materials acceptance, and field verification that the approved material was placed.

2.28.5 *Construction Quality Assurance and Quality Control Plan Requirements*

2.28.5.1 General

The QMP shall include a program for construction inspections, examinations, measurements, and tests of materials or elements for each Work operation, where appropriate, to verify quality. The requirement for these inspections is not limited to those required for quality testing purposes.

The QMP shall specify all aspects of QA and QC for construction. At a minimum, the QMP shall include the following items to verify that all construction activities conform to the Contract Standards:

- Project progress schedule
- Submittal schedule
- Design schedule, acknowledging documents, and packages that will be submitted for review
- Inspection requirements
- Instrumentation and survey monitoring for verification of the performance of the Project's geotechnical features
- Specific documentation for QA and QC activities, including control charts
- WSDOT requirements for corrective action and Corrective Action Plans when QC or acceptance QA criteria are not met

2.28.5.2 Weekly Scheduling Notice to WSDOT

The Design-Builder shall notify the WSDOT Engineer in writing before the close of business on Thursday of each week of planned construction activities, including fabrication, and shall describe the anticipated construction activities for the following week (Sunday through Saturday) to allow the WSDOT Engineer to schedule its resources. For activities occurring further than 60 miles from the Project, the Design-Builder shall give the WSDOT Engineer notification at least 14 Calendar Days prior to the planned Work.

2.28.5.3 Coordination and Notification

The CQAM shall designate a primary point of contact for notifications of inspections at Hold Points. An alternate contact may be designated to function in the primary contact's absence. The WSDOT Engineer will designate one Person to handle responses to the Design-Builder for written reports or releases for Hold Points.

The time necessary to respond to the notification for inspection at Hold Points shall be included in the QMP, and mutually agreed to by the Design-Builder and the WSDOT Engineer.

2.28.5.4 Hold Points

Hold Points shall be identified in the construction process where critical characteristics are to be measured and maintained and at points where it is impractical to determine the adequacy of either materials or workmanship once Work proceeds past this point. Pre-activity meetings shall be included in the Design-Builder's QMP as Hold Points. Hold Points shall be established where required QA inspection is mandatory. The Design-Builder shall provide the WSDOT Engineer with a minimum of 3 Calendar Days' notice of each Hold Point so that the WSDOT Engineer, at its discretion, can observe or visually examine a specific Work operation or test. Work shall not proceed until an inspection is performed and a written release is granted by the Design-Builder's QA organization.

The development of Hold Points shall occur during the final design. The EOR and the Designer of Record shall submit specific Hold Points with the Final Design Submittal and the RFC Documents.

At a minimum, the CQAM shall establish Hold Points at the stages listed below. The QMP shall identify any additional Hold Points necessary to certify compliance. The following Hold Points are not intended to limit or diminish the Design-Builder's responsibility to inspect all construction Work.

Utility Relocations

- Prior to any relocation of existing Utilities
- Prior to the backfill of Utility Relocations and as required by the Utility Owner's permit

Temporary Erosion and Sediment Control

- After installation of High Visibility Fencing around Environmentally Sensitive Areas, clearing limits, travel corridors, and stockpile sites
- After completion of placement of Temporary Erosion and Sediment Control (TESC) devices, and prior to any construction operations
- Prior to any TESC dewatering operations

Embankments (includes backfill behind walls and abutments)

- After clearing and grubbing and prior to placing embankment fill
- After completion of drainage (see drainage Hold Points)
- At all EOR Hold Points including settlement and pore pressure dissipation at a minimum
- At intervals of embankment construction every 5 vertical feet
- Prior to constructing foundations or structures supported in or on the embankments

- Prior to backfilling Utilities
- Completion of the subgrade

Structures

- At the completion of bridge embankment or excavation, and before the start of structure foundation
- Before saw cutting of concrete occurs
- Before pile driving or drilled shaft operations
- After completion of the first piling driven at each structure support, and at the completion of each pile group, for each structure support
- After completion of each drilled shaft along with nondestructive shaft testing, and at the completion of each drilled shaft group, for each structure support
- Before concrete placement of any subsurface element including concrete for cast-in-place piles and drilled shafts
- After installation of grout pad or anchor bolts prior to setting bearing or girder
- After girder and diaphragm placement
- Before concrete placement of bridge deck, approach slabs, diaphragms, moment slabs, traffic barrier, and parapet walls (with formwork, inserts, and reinforcement in place)
- After completion of excavation and prior to box culvert construction
- Before concrete placement of cast-in-place box culverts with formwork, inserts, and reinforcement in place
- Prior to installation of post-tensioning strands or bars
- Prior to jacking operations for post-tensioning with a hydraulic jack on the Site
- After completion of bridge deck grinding, overlay removal, and deck repair

Retaining Wall

- After completion of the soil foundation and before the placement of the leveling pad of a structural earth wall or the foundation of any other type of retaining wall
- Panel tolerances after completion of placement of panels for each structural earth wall prior to beginning of coping placement
- Before concrete placement of cast-in-place retaining walls with formwork, inserts, and reinforcement in place
- Before installation of any soldier pile, tieback, or ground anchor wall; and before/after verification tests

Noise Wall

- After completion of soil foundation and before the placement of footing formwork
- For precast panels, after the placement of 10 panels

Drainage

- After placement of pipe or box culvert and prior to backfilling
- After installation and placement of bands or gaskets and prior to backfilling
- After placement of catch basins and manholes and prior to backfilling
- After completion of drainage systems behind walls and before the backfill of wall

Stormwater Facility (including bioswales)

- After the layout of the stormwater facility
- After excavation and prior to installation of drainage structures
- Prior to the operation of the facility

In-Water Work

- Before conducting any in-water construction activities and prior to operating any equipment below the ordinary high water mark. This includes Work in wetlands, streams, or mitigation sites.
- Culvert replacement, removal, and extensions
- Prior to capturing and removing fish from the Site at any area that includes water bypass, in-water cofferdam, and any water area likely to be disturbed
- Prior to installing riprap or other bank stabilization
- Prior to reintroducing a stream into a newly constructed or previously dewatered channel

Subgrade, Surfacing, and Pavement

- After completion of subgrade and prior to surfacing placement
- After completion of surfacing placement and prior to asphalt treated base, HMA, and reinforcement for approach slab placement

Signs

- After signs are staked in the field and prior to installation

Local Agency

- Prior to any Work within Local Agency ROW

Electrical, Intelligent Transportation Systems, and Illumination

- As required by WAC 296-46B-010, inspection of electrical and traffic management systems that will be performed by WSDOT

- Prior to removal of existing illumination, and after new or temporary illumination is in place or operational, in accordance with TR Section 2.16, *Illumination*
- Prior to disconnection of any existing traffic signal or ITS communication system equipment, including copper and fiber-optic cables and connections, and after new or temporary communication system equipment is in place and operational
- Prior to any fiber-optic splicing operation

Landscaping and Aesthetics

- After preparation of the planting area and prior to installation of wood chip mulch or bark. Plant inspection prior to planting any plant material.

American with Disabilities Act (ADA) Compliance

- After layout and prior to installation of required ADA components.

2.28.5.5 Traffic Electrical Inspection

The Design-Builder shall inspect all electrical and ITS systems. In addition, WSDOT will inspect all electrical and ITS systems for code compliance, functionality, and acceptance as required by WAC 296-46B-010.

2.28.5.6 Performance Verification of Project Geotechnical Elements/Features

The QMP shall include a GSIP.

2.28.5.7 WSDOT Oversight

WSDOT will periodically audit the field performance of the Design-Builder's QA staff, testing frequencies, and acceptance testing results. The WSDOT Engineer will conduct oversight inspection audits to verify the adequacy of the Design-Builder's inspection activities and testing procedures.

2.28.5.8 Quality Assurance Inspection

The QMP shall contain Inspection Plans for each construction Work item included in the Project, whether performed by the Design-Builder, a Subcontractor, or a vendor. Work items may be definable features or items of Work defined by the Standard Specifications.

2.28.5.9 Inspection Guidelines

During the design of the Project, the Design-Builder shall review each item of Work to determine which significant characteristics of the items need to be monitored during the construction phase, to ensure that the completed Project will function in accordance with the design intent over its expected lifetime. The inspection guidelines shall include the appropriate criteria, tests, and inspection

requirements identified in the Standard Specifications, the WSDOT *Construction Manual,* and the WSDOT *Materials Manual.* The Inspection Plan shall address the following elements within each item of Work:

- Identification - Work items included in the Inspection Plan
- Characteristics - What characteristics of the item will be inspected?
- Acceptance Criteria - Directly or by reference, the Design-Builder shall provide sufficient information for the Inspector to use to determine if the item or activity is conforming or nonconforming. Maximum use of checklists shall be made for this purpose.

Inspections shall be performed during all phases of the Project from start to Completion to ensure that the Work meets and is being performed in accordance with the PDB Contract, RFC Documents, approved submittals, and any requirements of Local Agencies.

The Design-Builder shall conduct an examination of the quality of workmanship to confirm that all Work is being performed in accordance with the RFC Documents, and any understandings reached at the pre-activity meeting for that item of Work.

The Design-Builder shall conduct appropriate follow-up inspections, and sampling and testing of materials as each item of work progresses, to ensure consistency in workmanship, compliance with Contract requirements, Design Documents, and RFC Documents; and to ensure satisfactory performance of the Work in service.

2.28.5.10 Inspection Documentation

Each of the QA inspectors shall summarize their daily inspections, tests, and material sampling activities in a daily report. The QA Inspectors shall use WSDOT's IDR, or a similar form approved by the WSDOT Engineer, to maintain a written record of inspection results and shall provide copies of the daily reports to the WSDOT Engineer the next Calendar Day. The IDR shall include the following key points of record:

- Equipment
- Subcontractors, identifying Disadvantaged Business Enterprise Subcontractors (if applicable)
- Work performed by the Design-Builder, Subcontractor, or Material Supplier
- Weather conditions
- Inspections performed, the timing of the inspection, and their results, including any corrective actions taken. List special inspections and the timing of the inspection. Provide a summary of the results and any corrective actions taken, if available.

- Materials used, the manufacturer or source, product identity, and quantities
- Communications
- Temporary Work, such as shoring and falsework
- Type, location, and results of all tests performed
- Delays encountered
- Type of traffic control setup in accordance with approved MOT Plans, and any inspection and corrective action taken by the Design-Builder
- Any safety-related problems and corrective action taken
- All Nonconforming Work and the corrective action taken
- A copy of any checklist used for the inspection
- The Inspector's signature

2.28.5.11 Construction Inspection Forms and Checklists

The Design-Builder's QMP shall include construction inspection forms and checklists for all anticipated construction operations and processes, which shall be used by the Design-Builder's QA inspection personnel and other personnel responsible for QC, such as foremen and individual workers.

Construction inspection forms shall be used to document all construction Work activities required in the QMP. For each critical construction Work activity, construction inspection forms shall include activity-specific checklists approved by the WSDOT Engineer, prior to the start of the Work activity, and shall include photographs of specific activities after which it would be difficult to assess the Work. The checklist for each Work activity shall include the construction requirements described in the Standard Specifications or the PDB Contract for that Work activity. At a minimum, each checklist shall address the following:

Date	
Time	
Location	> Pier or structure component > Drainage code # > Compaction Report (referenced to centerline station and subgrade elevation, etc.)
Type of Inspection	Completion of drainage code, final check, pre-pour check, etc.
Specification Requirement	List of applicable specifications for this item including applicable design plan sheet

Frequency	Indicated test or inspection frequency if any (Refer to TR Section 2.25, *Control of Materials*, of the TR for material test requirements)
Items Inspected	List elements or items inspected (e.g., rebar, chair placement or pipe size and type, grate box, pipe bedding, etc.)
Conformation to Specifications	Verify Work and materials meet the appropriate specifications
Deficiencies Noted	Note any deficiencies in specifications
Individual Notified	Individual notified for corrective action (WSDOT notified)
Corrective Action Noted	What corrective action is required to ensure products conform to specifications

2.28.5.12 Right to Stop Work

If there is evidence that QMP procedures are not adequate, or if a problem is encountered during the oversight inspections or becomes evident during construction, the WSDOT Engineer may, at its sole discretion, stop Work until appropriate quality procedures have been established and implemented.

In addition, WSDOT retains the authority to stop Work without liability wholly or in part, if the Design-Builder fails to perform the following:

- Correct conditions that are unsafe for Project personnel or the general public
- Correct unacceptable construction practices

2.28.6 *Submittals*

2.28.6.1 Quality Management Plan

The Design-Builder shall submit an electronic copy of the draft QMP for Phase 2 Work for Review and Comment. The WSDOT Engineer will provide comments to the Design-Builder on each draft QMP. Following resolution of the comments, the Design-Builder shall submit one electronic copy on SharePoint of each final QMP.

Modifications to each final QMP shall be submitted to the WSDOT Engineer for Review and Comment. When all comments on the modifications are resolved, the Design-Builder shall submit one electronic copy of the revised QMP on SharePoint.

2.28.6.2 Executive Management Reviews and Internal Audits

The Design-Builder shall provide a hard copy of its Executive Management Reviews to the WSDOT Engineer within 20 Calendar Days of completion of the reviews.

The Design-Builder shall provide a hard copy of its internal audits of the QMP to the WSDOT Engineer within 20 Calendar Days of completion of the audit.

2.28.6.3 Review Documents

Prior to every design review, the Design-Builder shall provide the WSDOT Engineer with six hard copies and a complete set of electronic files on a USB flash drive of each design submittal to be reviewed, unless specified otherwise in this Section.

2.28.6.4 Quality Assurance/Quality Control Documentation

The Design-Builder shall include documentation with each submittal showing that the QA and QC processes have been completed by the DQAM. The WSDOT Engineer will not accept submittals without documentation that the QA and QC processes have been completed. Acceptable documentation for design submittals will include a marked set and a corrected clean set of plans and specifications, including annotations by the originator, checker, back-checker, corrector, and verifier, as described in this Section and in accordance with industry standards.

Submittal documentation shall demonstrate review and approval of submittal content from the various design team disciplines responsible for coordinating temporary and permanent Project elements

2.28.6.5 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related submittals that do not fit in the previous categories but are prepared in accordance with this Section.

End of Section